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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/954,717
Filing Date: September 17, 2001
Appellant(s): NODDINGS ET AL.

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GROUP 1700

David Griner
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 12, 2006 appealing from the Office action mailed February 13, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is substantially correct. Note: claim 51 is not in independent form. Further note, in summarizing claims 20, 38, 45, and 66 appellant does not fully map each limitation repeatedly, however, appellant maps each new limitation not addressed in summarizing the limitations in claims 1 and 19.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

5,031,984	Eide et al	7-1991
4,662,962	Malavieille	5-1987
4,466,697	Daniel	8-1984
5,389,312	Lebby et al	2-1995
6,208,791	Bischel et al	3-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Objections

1. Claims 4 and 20 are objected to because of the following informalities: In claim 4, line 2, "a mold" should be "the mold" and in claim 20, line 1, transitional phase is missing, i.e. "comprising." Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 19 is rejected under 35 U.S.C. 102(b) as being anticipated by Eide et al (U.S. 5,031,984).

Eide et al discloses a method of splicing optical fibers. The method includes providing a silicone elastomeric mold having a surface with precision grooves are

formed, placing the fibers into the grooves on the mold (Col 4, lines 14-20), providing a glass substrate with an ultraviolet curable adhesive on a surface over the mold and sandwiching the optical fibers in place (Col 4, lines 20-22), wherein the adhesive has index matching the characteristics matching those of the optical fibers (Col 3, lines 61-66), curing the adhesive with ultraviolet light (Col 4, lines 29-31), and a sealant material is used to seal the fiber (Col 4,lines 58-60)

4. Claims 20-23, 38, 45-51, 56-61, and 66 are rejected under 35 U.S.C. 102(b) as being anticipated by Malavieille (U.S. 4,662,962).

Regarding claims 20-23, 38, 45-50, 56-61, and 66, Malavieille discloses a method of connecting optical fibers. The method includes providing a soft support with at least one fiber-receiving groove (Col 3, lines 46-51), providing a plate and a transparent setable liquid material with a refractive index matching the fibers, and placing the liquid into the groove (Col 4, lines 31-34), placing the ends of the optical fibers into the liquid medium, which has the same refractive index to allow for transmission of light between the two fibers by attenuating index jumps in the separation diopter, i.e. forming an optical path between the fibers (Col 4, lines 39-44), which is a waveguide, with the facing ends at an angle of 0 degree (Figure 4), radiating the adhesive with ultraviolet radiation to cure the adhesive or waveguide (Col 4, lines 63-68), burying the splice in resin, which is sticky, to protect the splice as a whole and then the splice is covered with various forms of plastic or metal protective cap or sleeve (Col 5, line 67 to Col 6, line 3), which will mold the resin to the shape of the cap or sleeve and adhere to the waveguide.

Regarding claim 51, the cured adhesive material is a waveguide.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2, 55, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eide et al (U.S. 5,031,984) in view of Malavieille (U.S. 4,662,962).

Eide et al discloses a method of splicing optical fibers. The method includes providing a silicone elastomeric mold having a surface with precision grooves are formed, placing the fibers into the grooves on the mold (Col 4, lines 14-20), which will coupler for a light source such as a laser and a light detector (Col 4, lines 35-42), providing a glass substrate with an ultraviolet curable adhesive on a surface over the mold and sandwiching the optical fibers in place (Col 4, lines 20-22), wherein the adhesive has index matching the characteristics matching those of the optical fibers (Col 3, lines 61-66), curing the adhesive with ultraviolet light (Col 4, lines 29-31), and a sealant material is used to seal the fiber (Col 4,lines 58-60). Eide et al is silent as to the adhesive is the waveguide. However, providing the adhesive as the waveguide is well known and conventional a shown for example by Malavieille. Malavieille discloses a method of connecting optical fibers. The method includes providing a soft support with at least one fiber-receiving groove (Col 3, lines 46-51), providing a plate and a transparent setable liquid material with a refractive index matching the fibers, and

placing the liquid into the groove (Col 4, lines 31-34), placing the ends of the optical fibers into the liquid medium, which has the same refractive index to allow for transmission of light between the two fibers by attenuating index jumps in the separation diopter, i.e. forming an optical path between the fibers (Col 4, lines 39-44), which is a waveguide.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the adhesive with matching index to allow the adhesive to function as a waveguide as disclosed by Malavieille in the method of Eide et al to provide a method of splicing optical fiber, which are cheap and easy to use. (See Malavieille, Col 1, lines 16-18)

7. Claims 4-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eide et al (U.S. 5,031,984) in view of Malavieille (U.S. 4,662,962) as applied to claim 1 above, and further in view of Daniel (U.S. 4,466,697).

Eide et al as modified by Malavieille discloses providing a plate and burying the splice in resin, which is sticky, to protect the splice as a whole and then the splice is covered with various forms of plastic or metal protective cap or sleeve (See Malavieille, Col 5, line 67 to Col 6, line 3), which will mold the resin to the shape of the cap or sleeve and adhere to the waveguide. But is silent as to applying a third or additional formable material to form an enclosure or other protecting structure. However, providing additional formable material to form an enclosure or protecting structure is well known and conventional as shown for example by Daniel. Daniel discloses a method for optical fiber. The method includes providing a protective coating to the fiber, wherein

the coating may be several layers thick and may be formed of different transparent substances. (Col 7, lines 28-38)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide any additional formable material as protective coating as disclosed by Daniel in the method of Eide et al as modified by Malavieille to provide additional protective outer coating for the fiber. (See Daniel, Col 2, lines 34-37)

8. Claims 52-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eide et al (U.S. 5,031,984) in view of Malavieille (U.S. 4,662,962) as applied to claim 1 above, and further in view of Lebby et al (U.S. 5,389,312).

Eide et al as modified above is silent as to positioning the active optical component such as laser using bumps. However, using bumps to position components is well known and conventional as shown for example by Lebby et al. Lebby et al discloses a method of forming molded optical waveguides. The method includes using electrical contacts to position photonics devices such as photo detectors and light generating device fixed with bump bonding. (Col 5, lines 39-45)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use electrical contacts, which are bumps as disclosed by Lebby et al in the method of Eide et al as modified by Malavieille to automatically align the components. (See Lebby et al, Col 5, lines 43-45)

9. Claims 62-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malavieille (U.S. 4,662,962) as applied to claims 56, 61, and 66 above, and further in view of Bischel et al (U.S. 6,208,791).

Regarding claims 62, 63, 67, and 68, Malavieille as disclosed above is silent as to forming the waveguide by injecting the waveguide material under pressure or by screening or stenciling a wave guide material onto the mold plate. However, forming the waveguide by injecting or screening or stenciling a wave-guide material onto the mold plate is well known and conventional as shown for example by Bischel et al. Bischel et al discloses a method of forming an integrated optical microstructure. The method includes applying a polymer binder into a pit or groove, which is chemically compatible with materials for waveguide structure fabrication by stencil printing, volumetric dispensing with a syringe, i.e. under pressure, inkjet printing or roto-gravure printing. (Col 10, lines 15-37)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the wave guide material by stencil printing, or volumetric dispensing with a syringe as disclosed by Bischel et al in the method of Malavieille to provide any variety of techniques for dispensing the waveguide material into the pit or groove. (See Bischel et al, Col 10, lines 22-25)

Regarding claims 64 and 65, Malavieille discloses the optical fiber can be separated by a chosen length (Col 7, lines 50-64), which the groove would provide the needed alignment and inherently would be aligned within a small margin such as less than 5 or 3 μm.

Regarding claims 69 and 70, Malavieille discloses an optical fiber and the waveguide is adhered to the support. (Col 5, lines 7-13 and Figure 5)

(10) Response to Argument

Overview

In response to appellant's argument of Eide does not teach molding a waveguide, the examiner disagrees, since the adhesive material of Eide has index matching characteristics to coupling optical fiber (Col 3, lines 61-63), and the adhesive is applied into a mold with precision grooves to form corresponding to the desired position of the optical fibers and the adhesive is cured with ultraviolet light (Col 4, lines 11-22), the adhesive is functioning as a waveguide, since the light is conducted between the optical fibers by the cured adhesive or guiding the light from one end of the first optical fiber to the end of the second optical fiber. Otherwise, the light would scatter. Furthermore, claims do not exclude the step of active alignment of the optical fibers.

In response to appellant's argument of Malavieille does not teach forming a waveguide aligned to a component, the examiner disagrees, since Malavieille discloses the method is to connect or splice optical fibers between teledistribution network (Col 1, lines 16-24), which required an active optical component and the optical fiber is the other component and furthermore, the adhesive having a refractive index close to the fibers to improves the transmission of the light between the two fibers by attenuating index jumps in the separation diopters (Col 4, lines 39-44), which guide the light between the two fibers. Otherwise, the light would scatter instead. Furthermore, Malavieille discloses the fibers can be separated to provide a gap (Col 7, lines 60-64) of desire length and the adhesive fills the gap between the fibers, since the adhesive has a

refractive index differ from the open air, any light from the one end of the fiber would be refracted at the interface between the adhesive and the open air and into the other fiber.

A. First Grounds of Rejection

In response to appellant's argument of the adhesive as disclosed by Eide is not a waveguide, the examiner disagrees, since the adhesive material has index matching characteristics (Col 3, lines 61-66), which allow for the light to cross from the first optical fiber to the second fiber, which is being guided by the adhesive material otherwise the light would scatter. Furthermore, the examiner disagrees with appellant's argument of Eide discloses the fibers can be separated but it is Malavieille, which discloses the gap with one tenth to one half the diameter of the fibers (See Malavieille, Col 7, lines 4-10) but Malavieille also the fibers be provided with a gap of suitable length by putting end faces together and then to separate them by the chosen length.

In response to appellant's argument of Eide does not address the cladding material over the optical wave guide, the examiner disagrees, since the claim does not required the cladding material to have an index of refraction slightly less than that of the core to assist in guiding the light, although the claim is read in view of the specification but the limitation in the specification is not read into the claim and the examiner giving the cladding material with the broadest interpretation would include any material covering or encapsulate and seal the splice and therefore, Eide does recite the instant invention.

B. Second Grounds of Rejection

In response to appellant's argument of Malavieille adhesive is larger that the optical fiber in most places and would not effectively guide light back into the optical fibers back into the optical fiber, the examiner disagrees, since Malavieille does show a mold with a groove about the same size as the fiber (See Figures 1 and 2), the adhesive would be about the same size as the fiber and furthermore, Malavieille discloses a gap and a desired length of the gap by putting the fibers end face to face and then separate them by the chosen length (Col 7, lines 50-64), therefore, the adhesive must guide the light from one fiber end to the other fiber end and acting as a waveguide.

In response to appellant's argument of claim 21 of Malavieille does not disclose a molded support structure, the examiner disagrees, since Malavieille discloses a protective resin, which glue a number of plates thereby supporting the number of plates and protecting the splice (Col 6, lines 4-10), which therefore, a supporting and protecting structure for more than one splice.

In response to appellant's argument of claim 22 of Malavieille does not discloses a prefabricated molded support structure onto the optical waveguide, the examiner disagrees, since Malavieille discloses the splice as a whole can be covered with various forms of plastic or metal protective cap or sleeve, which are prefabricated and the plastic and metal cap or sleeve would be molded.

In response to appellant's argument of claim 38 of Malavieille does not form a connecting structure, the examiner disagrees, since Malavieille discloses the optical fibers are immersed in the settable liquid or adhesive in the groove (Col 4, lines 39-44),

the groove provide the structure the adhesive will form and furthermore, Malavieille discloses a gap of desired length by separating the optical fibers (Col 7, lines 56-64), which provided the teaching of length of adhesive cured with a proximal end connecting to one end of first optical fiber and a distal end connect the second optical fiber.

In response to appellant's argument of claim 45 of Malavieille does not teach a formable waveguide, the examiner disagrees since Malavieille discloses the settable resin in the groove of the mold (Col 4, lines 39-44) and setting the liquid in the mold with UV radiation (Col 4, lines 63-68), which the material has a refractive index close to the fibers, which allow attenuating index jumps (Col 4, lines 39-44) or guide the light, i.e. waveguide.

In response to appellant's argument of claim 47 and 48 of Malavieille does not disclose a molded support structure, the examiner disagrees, since Malavieille discloses a protective resin, which glue a number of plates thereby supporting the number of plates and protecting the splice (Col 6, lines 4-10), which therefore, a supporting and protecting structure for more than one splice.

In response to appellant's argument of claim 48 of Malavieille does not address the cladding material over the optical wave guide, the examiner disagrees, since the claim does not required the cladding material to have an index of refraction slightly less than that of the core to assist in guiding the light, although the claim is read in view of the specification but the limitation in the specification is not read into the claim and the examiner giving the cladding material with the broadest interpretation would include any material covering or encapsulate and seal the splice when a number of plates are

stacked and glued together with the resin (Col 6, lines 4-10) and therefore, Malavieille does recite the instant invention.

In response to appellant's argument of claim 56 of Malavieille does not teach "applying a formable material into the mold to form a light carrying waveguide, the examiner disagrees, since Malavieille discloses applying a settable material into the mold with the material having a refractive index close to the fiber (Col 4, lines 39-44), which is capable of carrying light.

In response to appellant's argument of claims 58 and 59 of Malavieille does not address the cladding material over the optical wave guide, the examiner disagrees, since the claim does not required the cladding material to have an index of refraction slightly less than that of the core to assist in guiding the light, although the claim is read in view of the specification but the limitation in the specification is not read into the claim and the examiner giving the cladding material with the broadest interpretation would include any material covering or encapsulate and seal the splice when a number of plates are stacked and glued together with the resin, which mold the resin (Col 6, lines 4-10) and therefore, Malavieille does recite the instant invention.

In response to appellant's argument of claims 61 and 66 of Malavieille does not teach waveguide guide being sufficiently aligned with active optical element to eliminate the need or requirement for active alignment, the examiner disagrees, since Malavieille discloses the method is for connecting fibers for teledistribution network (Col 1, lines 16-24), which require at lease one active component to send light and at least one passive for receiving lights, the fibers would considered to be one active component and one

passive component and furthermore, Malavieille discloses the fibers can be separated with the desired length, which does not require active alignment.

C. Third Grounds of Rejection

In response to appellant's argument of claim 1 of Malavieille or Eide does not teach waveguide guide being sufficiently aligned with active optical element to eliminate the need or requirement for active alignment, the examiner disagrees, since Malavieille discloses the method is for connecting fibers for teledistribution network (Col 1, lines 16-24), which require at lease one active component to send light and at least one passive for receiving lights, the fibers would considered to be one active component and one passive component and furthermore, Malavieille discloses the fibers can be separated with the desired length, which does not require active alignment. And Eide does recite splicing the fiber to an active component and claim 1 does not exclude the step of active alignment of the components. The combination of Eide and Malavieille discloses the instant invention.

D. Fourth Grounds of Rejection

In response to appellant's argument of claims 4-13 of Daniel does not teach "applying a second formable material to fix the first and second components together in alignment," the examiner agrees, since the examiner relied on Eide and Malavieille to provide the recited teaching.

E. Fifth Ground of Rejection

In response to appellant's argument of claims 52-54 of Lebby does not teach positioning a first and a second component in a mold and forming a waveguide between

them, the examiner agrees, since the examiner relied on Eide and Malavieille to provide the recited teaching and the examiner only relied on Lebby to provide the teaching of attaching the active optical component such as laser.

F. Sixth Ground of Rejection

In response to appellant's argument of claims 62-70 of Bischel does not stencil printing a waveguide, the examiner disagrees, since Bischel does recite the material is chemically compatible with the material used for the waveguide structure fabrication, the examiner is taking the position the binder or material is chemically the same or similar to the waveguide material, which is chosen to have a refractive index that closely matches that of the glass or crystal so that input light and/or output light exhibits essentially no optical scattering. (Col 6, lines 45-63) Therefore, the binder or material that is chemically the same to the waveguide material is a waveguide material and Bischel provide the teaching of applying the waveguide material with stencil printing, volumetric dispensing with a syringe, i.e. under pressure, inkjet, or roto-gravure printing. (Col 10, lines 15-37)

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Chan Sing Po

Sing P Chan

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